

Nakamichi 350

2 Head Cassette Deck Operating Instructions

WARNING

TO PREVENT FIRE OR SHOCK
HAZARD, DO NOT EXPOSE
THIS APPLIANCE TO RAIN OR
MOISTURE.

A record of the serial number will help you in the event of insurance claims, shipping or warranty service. Record the serial number (embossed on a plate on the rear panel of the unit) in the space provided below.

Model Number: Nakamichi 350

Serial Number: _____

Contents

Control Functions	1, 2
Important Notices	3
Connections	4, 5, 6
Mounting Instructions	7
Fuse Replacement	8
Playback Procedure	9
Recommended Cassette Tapes and Tape Selector Switch	10
Record Procedure	11
Dolby Noise Reduction System	12
Maintenance, Service Information	13
Troubleshooting Chart	14
Specifications	15
Accessories	16

We wish to take this opportunity to thank you for your purchase.

Your Nakamichi 350 should provide you with many years of trouble-free use assuming it is operated and maintained as outlined in this manual.

Please take the time to read this manual in its entirety before attempting to operate or install your 350.

If you are using your 350 with one of the ADS miniature speaker systems, which we most strongly recommend, please also read the instructions accompanying the ADS product before proceeding with interconnections.

Thank you.

Nakamichi Corporation

Control Functions

TAPE COUNTER

Facilitates the location of pre-recorded selections on the cassette.

CASSETTE LID

PAUSE BUTTON

Depressing this button will cause the tape to temporarily halt in the Play or Record Mode. Depressing it a second time will release the transport from the Pause mode.

FAST FORWARD BUTTON

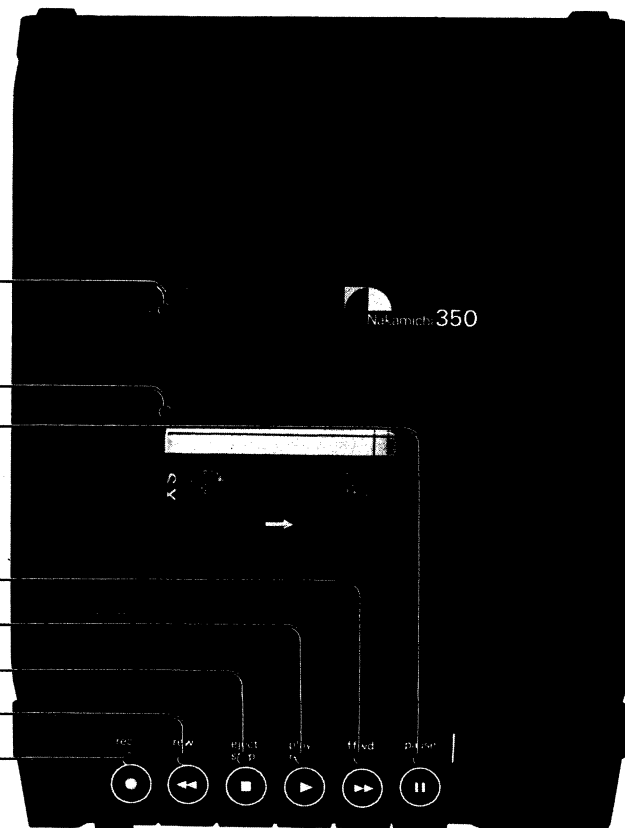
PLAY BUTTON

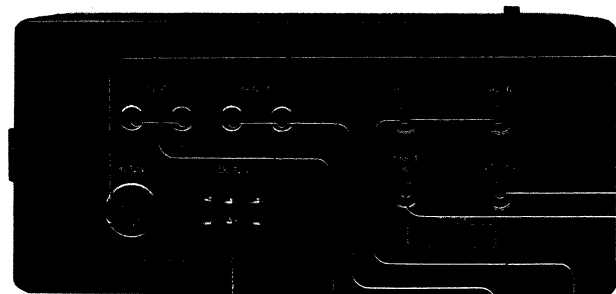
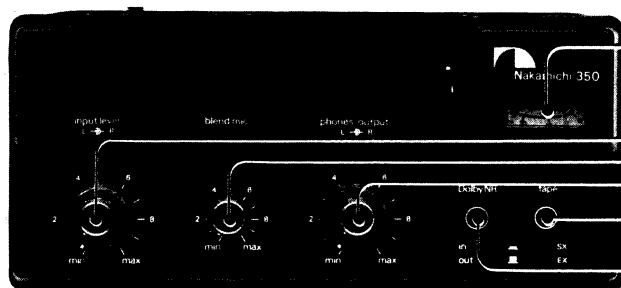
STOP/EJECT BUTTON

It is necessary to depress the Stop button when changing from one transport mode to another. An extra firm push of this button will eject the cassette.

REWIND BUTTON

RECORD BUTTON





PEAK LEVEL METER

Reads the higher of the left and right channels during record and playback.

INPUT LEVEL CONTROLS

Controls line input recording levels unless the Left and Right microphones are in use, in which case these control the L/R Mic input levels. Controls are concentric and friction coupled so that individual levels for each channel may be set separately.

BLEND MIC LEVEL CONTROL

PHONES/OUTPUT LEVEL CONTROL

Controls the levels at the Headphone and Line outputs. Controls are concentric and friction coupled so that L/R balance may be obtained.

TAPE SELECTOR SWITCH

DOLBY NOISE REDUCTION SYSTEM SWITCH

DC 12 VOLT JACK

Accepts the AC Power Pack which allows home use of the 350.

HEADPHONE JACK

For best results use moderate to high efficiency stereo headphones within the impedance range of 8-16 ohms.

BLEND MIC INPUT JACK

6 PIN DC 12 VOLT CAR CONNECTOR

This single connector interfaces the 350 to the ADS 2002 system. All audio and power connections are made through this connector. The ADS 2002 system is supplied 12 volts DC only when the 350's play button is depressed.

LEFT AND RIGHT MIC INPUT JACKS

LINE OUTPUT JACKS

LINE INPUT JACKS

Important Notices

1. It is imperative that the heads, capstan and pressure roller be cleaned frequently. Most of the problems you are likely to encounter can usually be traced to dirty heads and/or dirty capstan and pressure roller. See page 13.
2. The Nakamichi 350 is equipped with the B type Dolby Noise Reduction circuitry. Make sure to switch the circuit IN when playing Dolby encoded cassettes and OUT when playing non-encoded cassettes.
3. The EQ switch on the 350 must be set for the cassette to be played. The choice of either 70 or 120 microseconds will depend on the type of tape and which equalization was used during the recording of that tape. See page 10.
4. Take good care of your cassette tapes. They should always be stored in their plastic boxes to protect them from dust. Avoid touching the tape itself. With proper care your cassette tapes will provide you with many years of enjoyment.
5. Avoid the use of inferior cassettes. By sticking to well known brands, you can avoid premature head replacement and possible damage to the 350's transport mechanism. **WE DO NOT RECOMMEND THE USE OF C-120 OR CHROMIUM DIOXIDE CASSETTE TAPES.**
6. Wind up any slack in the tape manually before inserting the cassette to prevent the possibility of jamming.
7. The Nakamichi 350 will operate only in 12 volt **NEGATIVE GROUND** systems.
8. When installing the 350 in a car, boat or plane, make sure its normal operating position is as level as possible.
9. Keep the 12 volt supply wire away from wiper motors, light switches or any other device that is likely to induce unwanted noise.
10. Do not install the 350 too close to heat or air conditioning ducts.
11. Even in mild weather, if all the windows are kept closed, the temperature inside a car may rise to levels high enough to cause damage to the 350 and to cassette tapes. The 350 and the tapes should be removed from the vehicle if it is to be parked for an extended period in direct sunlight. If this is not possible, make sure there is some ventilation, and keep the 350 and the tapes out of the path of direct sunlight. Never store the 350 or your cassette tapes in the glove compartment or the trunk for long periods in hot weather.

Connections 1

Using the 350 with the ADS 2002 System

The Nakamichi 350 can be easily connected to the ADS 2002 bi-amplified miniature speaker system to provide an extremely high quality cassette playback system in automobiles, planes, boats or any other mobile environment with a 12 volt DC source. The system can also be used indoors with household AC power by utilizing a special optional AC adaptor available from ADS (not the AD-550/551 AC Power Packs manufactured by Nakamichi). Connect the 350 to the ADS system as described below:

1. Locate the 20 ft. connecting cable supplied

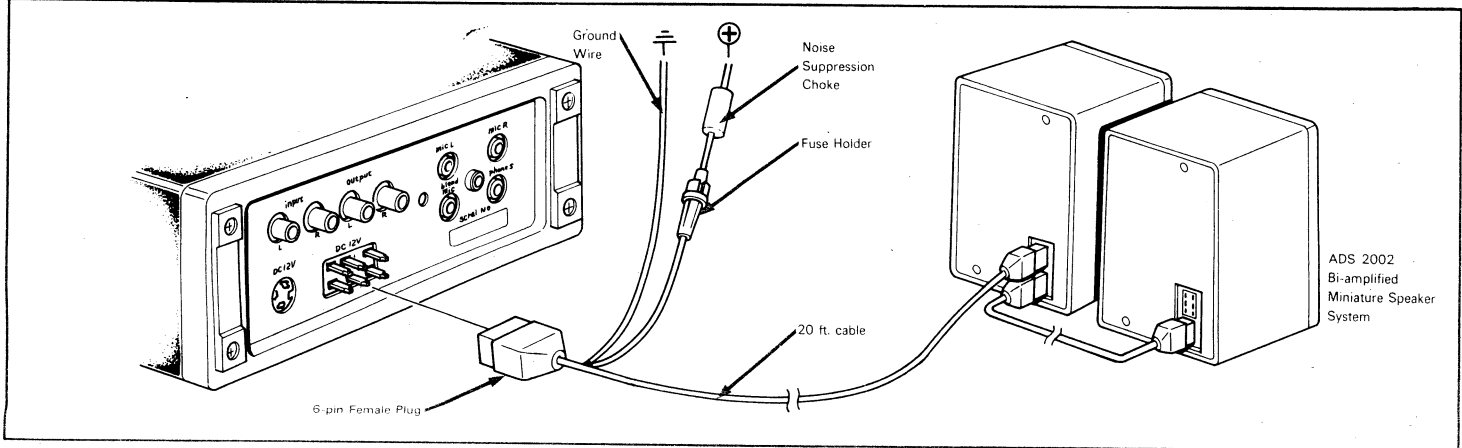
with the ADS system. One end is fitted with a female 6 pin plug and two "pigtail" wires.

2. The two pigtail wires should be connected to the 12 volt DC source at suitable points in the vehicle's wiring system. The wire with the built-in fuse holder and noise suppression choke should be connected to the +12 volt source, and the remaining wire should be secured to a suitable ground. Consult the literature accompanying the ADS system for further recommendations on connecting the system to the battery supply. If you are unfamiliar with your vehicle's wiring system, it is best to consult a qualified mobile stereo systems dealer.

3. Connect the female 6 pin connector at the end of the 20 ft. ADS cable to the male 6 pin 12 volt car connector on the rear panel of the Nakamichi 350 as shown in the illustration below.
4. Consult the ADS operating instructions for speaker interconnections.

Note:

- 1) Since all audio and power connections are made with the single 6 pin connector it is unnecessary to make any connections to the 350's line outputs.
- 2) When using the system indoors with the ADS 2002 AC Adaptor, follow the connecting instructions supplied with the AC Adaptor.



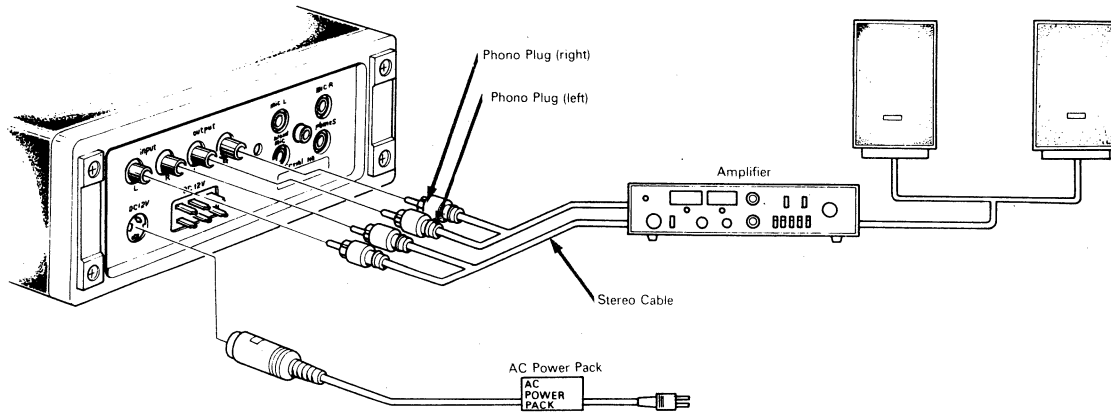
Connections 2

Using the 350 in a Home System

1. Connect the optional AC Power Pack to the DC 12 volt jack on the 350.
2. Plug the AC Power Pack into the wall socket.
3. Connect the line output jacks of the 350 to the "Tape In" or "Tape Play," jacks of the amplifier or receiver of the music system. Use a standard double phono plug-to-phono plug stereo connecting cable, and observe

left and right indications.

4. In a similar manner, connect the line input jacks of the 350 to the "Tape Out" or "Tape Rec" jacks of the amplifier or receiver.



Connections 3

Using the 350 with its Carrying Case (optional)

1. Install the 350 in its carrying case in the following manner:
 - a) Open the rear flap of the carrying case and make sure that the 6-pin connector is out of the way.
 - b) Slowly slide the 350 into the carrying case as shown in the illustration. It may be necessary to slightly lift the front

edge of the case to make sure it clears the tape counter button on the 350.

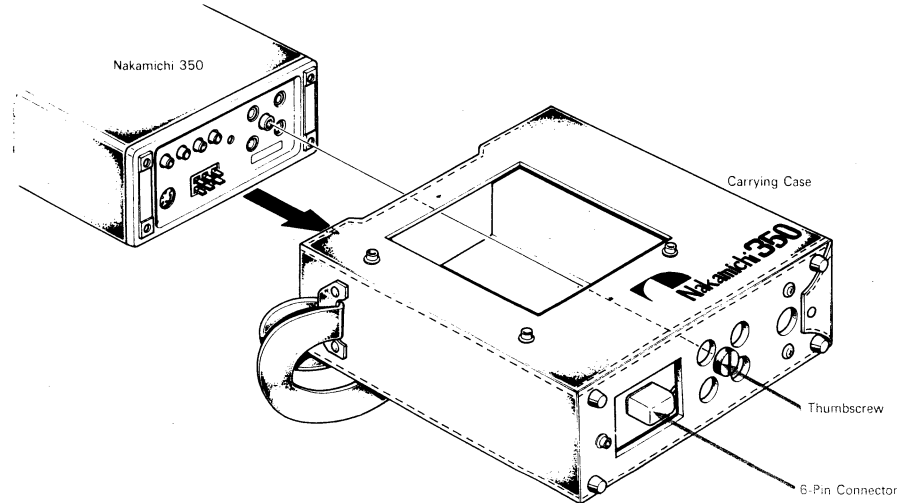
- c) Once the 350 is properly seated in the case, tighten the thumbscrew at the bottom of the case to secure the unit.

Note: The rear flap of the carrying case should be turned around and fastened on the side of the carrying case to keep it out of the way.

2. Connect the 6-pin connector on the carrying case to the 6-pin 12 Volt DC Car Connector on the rear panel of the 350.

Note: This connector should be unplugged when the rear flap of the carrying case is to be closed.

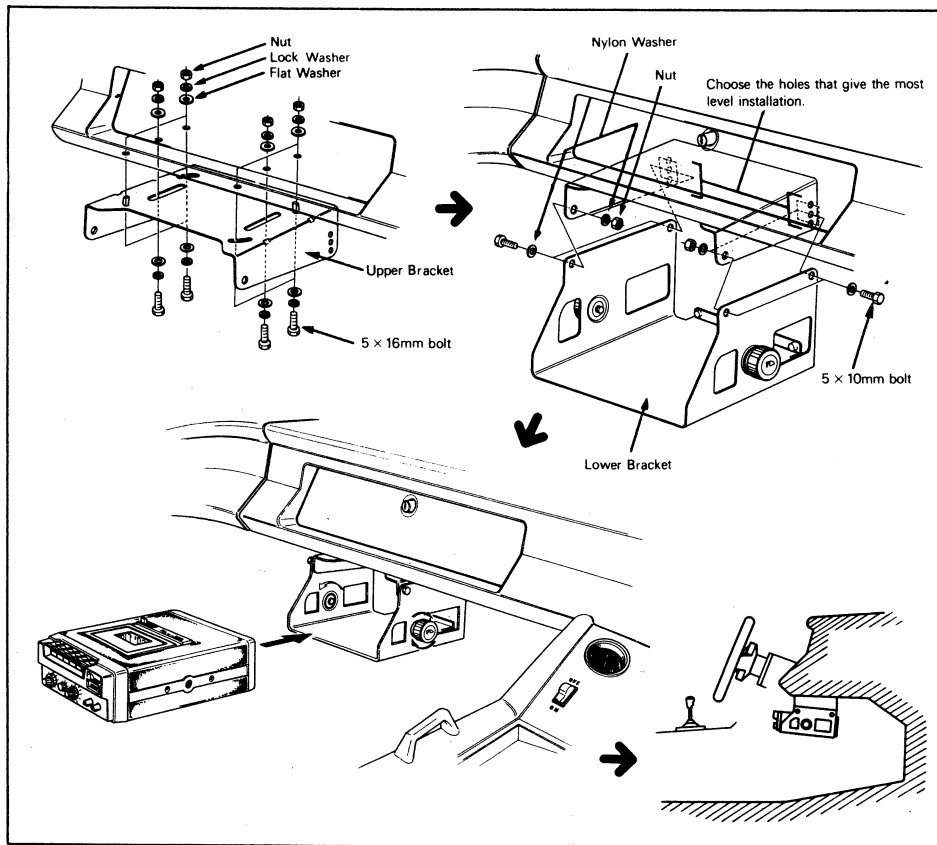
3. Connect microphones and headphone to the appropriate jacks on the rear panel of the 350.



Mounting Instructions

Using the mounting bracket

1. Choose a mounting location that is sufficiently far from all heat and air conditioning ducts (especially the former). Make sure that the 350 can be mounted as level as possible.
2. Using the upper bracket as a template, drill four holes using a 6mm or 1/4 inch drill as shown in the illustration.
3. Attach the upper bracket to the dashboard using the nuts, washers and 5 x 16 bolts as shown in the illustration.
4. Using the four 5 x 10 bolts, washers and nuts, attach the lower bracket to the upper bracket as shown in the illustration. Choose the rear holes on the upper bracket that yields the most level installation of the lower bracket.
5. Place the 350 on the lower bracket and push it in as far as it will go.
6. Tighten the two dial knobs on the lower bracket to secure the 350.
7. Make the appropriate connections as instructed on page 4.

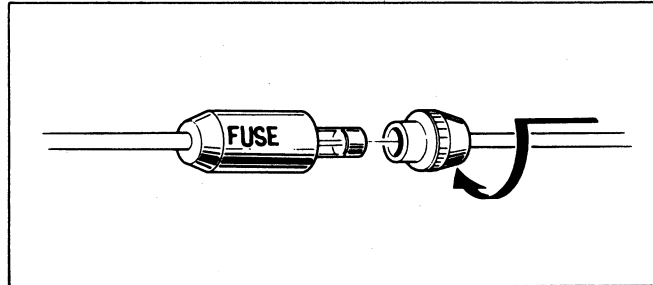


Fuse Replacement

The 12V supply wire for the 350/2002 system incorporates an in-line fuse holder. The fuse inside this holder will blow if a short circuit or unusually heavy load exists in the power line. If the fuse should blow, it may be an indication of an error in wiring, a loose wire or a defect somewhere in the system. Check all wiring, then replace the fuse in the following manner:

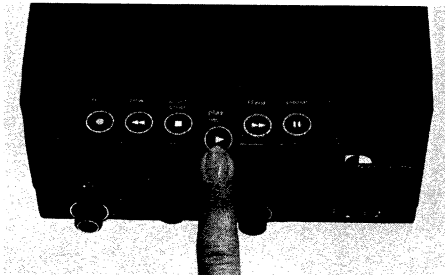
1. Disconnect the 6-pin plug from the rear panel of the 350.
2. Open the fuse holder by first pushing the two ends together and then twisting as shown in the diagram.
3. Remove the blown fuse and install the proper replacement (6 ampere, fast-acting type).
4. Re-connect the 6-pin plug.

Note: If, upon attempting to operate the system, the fuse blows again, have the system checked by a qualified service technician.

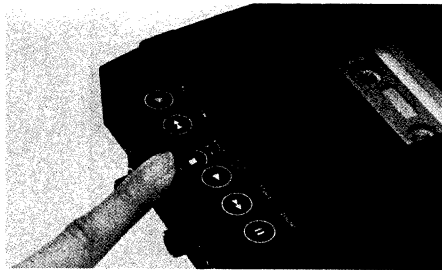


Playback Procedure

- 1) Open the cassette lid by firmly pressing the Stop/Eject button.
- 2) Insert the cassette into the well and press down on the cassette until it is firmly in place.
- 3) Close the cassette lid. If it does not close completely, eject the cassette and repeat step 2.
- 4) Select the proper playback equalization by using the Tape Selector switch. If you are unsure of which position to use, consult the table of recommended cassette tapes on page 10.
- 5) Depress the Dolby NR switch to the "IN" position if the tape to be played was Dolby encoded during record.
- 6) Depress the Play button.



- 7) Turn the Output Level Control to the desired listening level. If the 350 is being used in conjunction with a home music system, it may be desirable to leave the Output Level Control at maximum (fully clockwise) and adjust the listening volume with the preamplifier/amplifier/receiver in the system.
- 8) Depressing the Pause button will temporarily halt the tape. Depressing the Pause button a second time will resume the playing of the cassette.
- 9) To stop the cassette, depress the Stop/Eject button lightly. A firm push of this button will cause the cassette to eject.



- 10) If the cassette is allowed to play to its end, the 350 will automatically return to the Stop mode.

Note: The 350 has no power switch as such. Depressing the transport function buttons automatically turns on the power. The entire deck is "off" in the stop mode. In addition, if the 350 is being used with one of the ADS miniature speaker systems with the proper connecting cables, power to the ADS system will be turned "on" only when the Play button on the 350 is depressed.

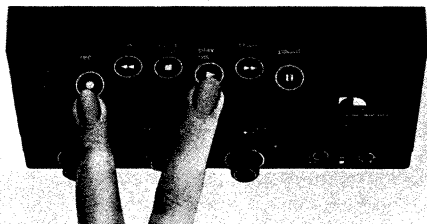
Recommended Cassette Tape and Tape Selector Switch

The tape selector switch on the Nakamichi 350 has been specially designed to simultaneously change both the Bias and Equalization. Although the unit has been factory adjusted for Nakamichi EX (or EX II) tape in the "EX" position and for Nakamichi SX tape in the "SX" position, certain other tapes shown in the recommendation table below may be used with excellent results. The "EX" position utilizes the standard 120 microsecond equalization and a "high" bias (approximately 10% higher than normal) compatible with a variety of low-noise/high-output/high-density formulations. The "SX" position utilizes the "high resolution" 70 microsecond equalization and a special bias (approximately 45% higher than normal) which allows the use of high coercivity tapes. To realize the full potential of your Nakamichi cassette deck, it is recommended that you use one of the following cassette tapes (tapes other than Nakamichi are listed in alphabetical order):

Position of Tape Selector Switch	Brand	Type or Model
SX 	Nakamichi Fuji Maxell TDK	SX C-60, C-90 FX II C-60, C-90 UDXL-II C-60, C-90 SA C-60, C-90
EX 	Nakamichi Nakamichi Fuji Maxell Maxell TDK	EX C-60, C-90 EX II C-60, C-90 FX I C-60, C-90 UD C-60, C-90 UDXL-I C-60, C-90 AD C-60, C-90

Record Procedure

- 1) Open the cassette lid by firmly depressing the Stop/Eject button.
- 2) Insert the cassette into the well and press down on the cassette until it is firmly in place.
- 3) Close the cassette lid. If it does not close completely, eject the cassette and repeat step 2.
- 4) Set the Tape Selector switch to the proper position for the type of tape in use (see page 10.)
- 5) Depress the Dolby NR switch to the "IN" position if the recording is to be Dolby encoded.
- 6) Reset the Tape Counter to "000" by depressing the reset button.
- 7) Depress the Pause button.
- 8) Depress the Record button. While holding it down, push the Play button until both buttons lock into place.



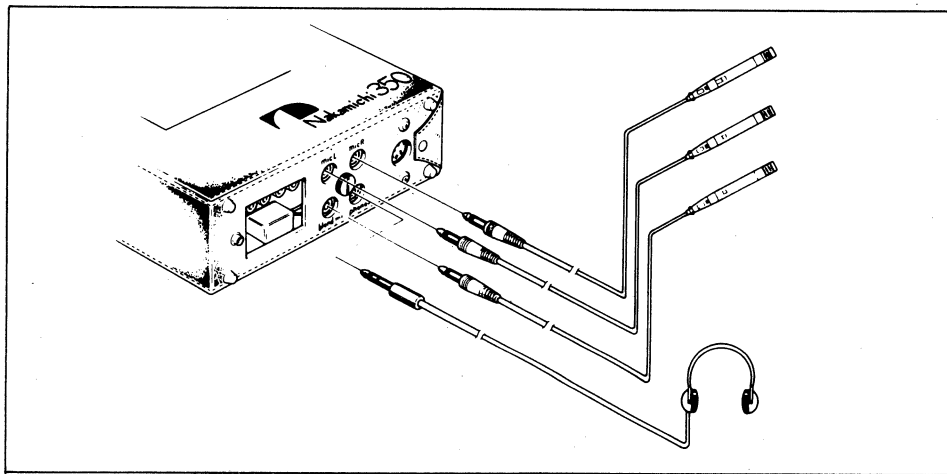
- 9) Adjust the recording levels while in the Record/Pause mode. Take a sample of the material to be recorded (pick the loudest passage). Set the Input Level Controls so

that the Peak Meter indicates just up to the red (0 dB) on maximum peaks (see note below). If the left and right channels are to be checked independently, turn only one Input Level Control up at a time (hold the outer knob fixed while turning the inner, and vice versa).

- 10) Start recording by depressing the Pause button to release it.
- 11) At the end of the recording, stop the deck by depressing the Stop/Eject button.

Note: Recording levels will vary depending on the type of source material and the type of tape in use. With certain types of music and tape it may be possible to record with the Peak Meter indicating slightly into the red. Other combinations may require more conservative level settings. It is best to experiment with various situations to gain maximum familiarity with your 350.

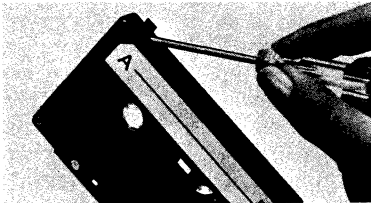
- 2) Plugging microphones into the 350's left and right mic jacks will cause the line inputs to be blocked. If a recording is to be made from the line inputs,



Dolby Noise Reduction System

make sure no microphones are plugged into the left and right inputs (this does not apply to the Blend Mic).

- 3) In order to prevent the accidental erasure of a recording at some future date, break off the tabs on the top edge of the cassette as shown in the photograph below. This will prevent the recorder from going into the record mode. Break off both tabs only if both sides A and B are to be protected. The tab for any given side of a cassette is located on its upper left.

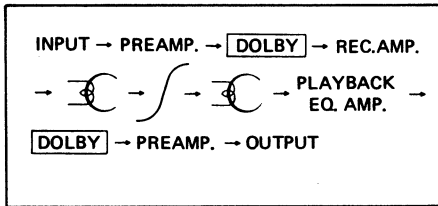


The Dolby Noise Reduction System

The Nakamichi 350 incorporates the "B-Type" Dolby Noise Reduction circuitry under license from Dolby Laboratories, Inc. It is a system that significantly reduces the "hiss" noise, which, although inherent in magnetic tape

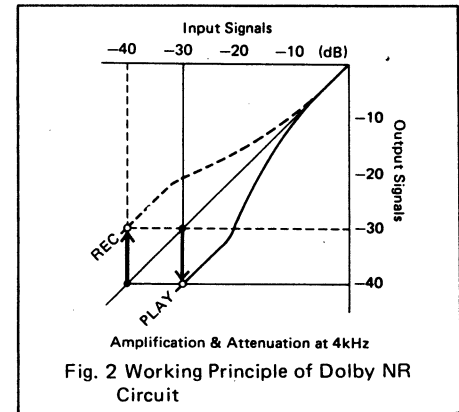
recording, is particularly noticeable in cassette recording because of the narrow track width and slow tape speed.

Such tape noise is generally distributed over a frequency range of 2 kHz to 10 kHz. Very basically, the Dolby System reduces the noise by amplifying the signals in this range during record and attenuating them during playback as shown in Fig. 1.



In actuality, however, the system is quite a bit more complicated because it is clear that if all high frequency signals were boosted during record, the tape would become grossly saturated and the sound would be very distorted. The Dolby System, therefore, is selective in its boosting: a special threshold sensing circuit makes sure that only the low level high frequency signals are amplified (the lower the level, the greater the boost). This same circuit is applied in reverse during the playback process to restore flat frequency response. In attenuating the boosted signals it also reduces the noise. If high frequency signals (at 4 kHz) of -40dB , for example, enter the Dolby circuit during

record, they will be boosted to a level of -30dB before being recorded onto the tape. Then, during playback, high frequency signals entering the Dolby circuit at a level of -30dB will be attenuated to a level of -40dB . The accompanying reduction in the recorded noise will be 10dB . The circuit, however, will not affect signals greater than -5dB (see Fig. 2).



As is clear from the foregoing explanation, it is possible to gain an overall improvement in signal-to-noise ratio of approximately 10dB if a tape is recorded and played with the Dolby System. The system, furthermore, is internationally standardized so that any tape recorded on any machine with Dolby NR can be played on any other machine with Dolby NR.

Maintenance

Cleaning

All parts that come into contact with the tape must be frequently cleaned. Even the best tape formulations leave a deposit of oxide shavings on the heads, pressure roller and capstan. Failure to perform a periodic cleaning of these parts can result in signal dropouts, loss of high frequencies and excessive wow/flutter. A cleaning kit is supplied with the Nakamichi 350, but some Q-tips and methanol alcohol (preferably undiluted) will perform quite adequately.

Dip the Q-tip in alcohol and squeeze off the excess. Rub the Q-tip over the surface of the heads. To clean the capstan and pressure roller, put the deck into the play mode with the power on. Apply the moist Q-tip to the right side of the rubber pressure roller (applying to the left side may cause cotton to become

caught between the roller and the capstan). Move the Q-tip about so as to clean the entire surface of the roller. Then, put the machine into the fast forward mode and repeat the process with the capstan.

Demagnetizing

All metal parts that come into contact with the tape must be occasionally demagnetized to prevent the build-up of residual magnetism that can add hiss to and partially erase the high frequencies on a tape being played. Although the heads and capstan of Nakamichi cassette decks require demagnetization much less frequently than most other tape decks, it should nevertheless be performed once every 50 hours of use to be on the safe side. A Nakamichi Demagnetizer is recommended for this purpose since it is specially designed for ease of use with cassette decks, but any properly designed demagnetizer will do.

Remove all tapes from the vicinity of the tape player before proceeding. Make sure the tape deck is "OFF". Turn the demagnetizer on and slowly bring the tip as close as possible to the rec/pb head. Do not make contact with the head unless the tip of the demagnetizer is covered with thin vinyl or rubber to avoid scratching the surface of the head (a piece of vinyl tape may be used to cover the tip if it is not already covered). Move the demagnetizer tip slowly in a random pattern about the surface of the head for at least 10 seconds and

then slowly move it toward the capstan. Repeat with the capstan, and then slowly withdraw the demagnetizer. Turn it off after it is at least 2 feet (approximately 60 cm) from the player. Never turn the demagnetizer off while it is close to the head or capstan as this may semi-permanently magnetize the metal part. It is not necessary to demagnetize the erase head.

Lubrication

The moving parts of the Nakamichi 350 transport are fitted with oil-less bearings. It is not necessary for the user to provide lubrication.

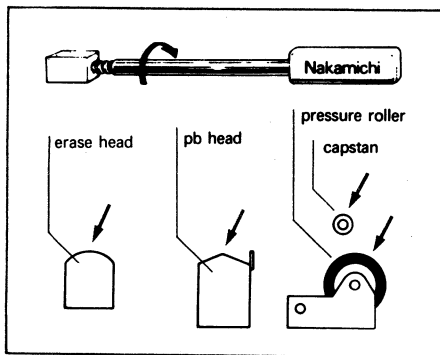
SERVICE INFORMATION

Repairs

Please read the Warranty Card and/or notices accompanying this unit very carefully.

We sincerely trust that you will never experience difficulties with your Nakamichi 350, but should it ever require servicing, please consult your Nakamichi dealer or the Nakamichi dealer closest to you. As there are no user serviceable parts inside the unit, please do not attempt your own repairs.

Thank you for your confidence in Nakamichi products.



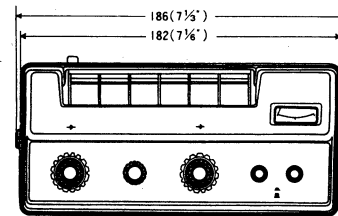
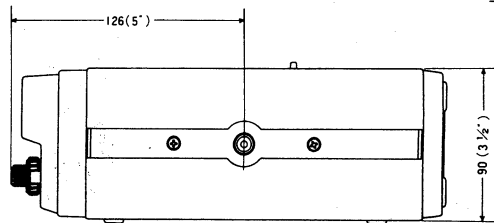
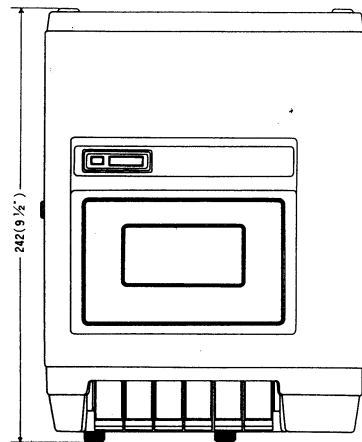
Troubleshooting Chart

CONDITION	PROBABLE CAUSE	REMEDY
No power	Blown Fuse. Ignition key switch is "off". No AC power to AC adaptor.	Replace Fuse. Turn on ignition key switch. Check AC power source. Use a different wall outlet, if necessary.
	Poor Connection:	Check all power connections.
No sound	Tape loose inside cassette. Poor cassette insertion. Jammed cassette. Dirty heads, capstan, roller. Poor connection.	Eject cassette, wind up any slack and re-insert. Eject cassette and re-insert. Replace or repair cassette. Clean all dirty parts. Check all audio connections.
Noise during playback	(Hiss noise) Head is magnetized. Poor power or audio connection. Induced engine or motor noise.	Demagnetize heads and capstan. Re-check all connections. Re-position all audio and power wiring away from motors, ignition lines, etc.
Excessive wow and flutter Dropout of sound	Dirty heads, capstan, pressure roller. Defective cassette. Poor recording.	Clean all dirty parts. Replace or repair cassette. Re-record or replace cassette.
Distortion	Distorted recording. Dirty head. Deformed tape.	Re-record or replace cassette. Clean head. Replace cassette.
Loss of high frequencies	Magnetized head. Dirty head. Improper EQ selected. Dolby NR being used with non-encoded tape.	Demagnetize heads and capstan. Clean head. Select proper EQ switch position. Switch Dolby NR off.
No fast forward or rewind	Poor tape winding.	Eject and re-insert cassette. Replace if necessary.
Uneven sound	Dirty heads, capstan, pressure roller.	Clean all dirty parts.
Crosstalk	Dirty capstan, pressure roller.	Clean all dirty parts.

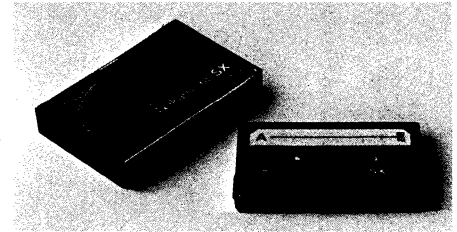
Specifications

Power Supply	12 V DC (AC with AC Power Pack)
Power Consumption	5 W
Tape Speed	1-7/8 inches per second 4.8 centimeters per second
Wow & Flutter	Less than 0.13% (DIN 45507 Wtd Peak) Less than 0.08% (Wrms)
Frequency Response	40 — 15,000 Hz $\pm$ 3 dB (SX, EXII tapes, with or w/o Dolby)
Signal-to-Noise Ratio	Better than 58 dB (@ 400 Hz, 3% Distortion, CCITT, Wrms, SX tape)
Total Harmonic Distortion ...	Less than 2% (@ 400 Hz, 0 dB)
Erasure	Better than 60 dB (@ 1 kHz saturation level)
Channel Separation	Better than 35 dB (@ 1 kHz, 0 dB)
Crosstalk	Better than 60 dB (@ 1 kHz, 0dB)
Bias Frequency	105 kHz
Input Sensitivity/Impedance	
Mic	0.2 mV/600 ohms
Blend Mic	0.2 mV/600 ohms
Line	50 mV/50 kohms
Output Level	
Line	580 mV (0 dB)
Headphone	2 mW into 8 ohms (0 dB)
Dimensions	7-1/3"(W) x 3-1/2"(H) x 9-1/2"(D) inches 186(W) x 90(H) x 242(D) mm
Weight	6.6 lbs. (3 kg)

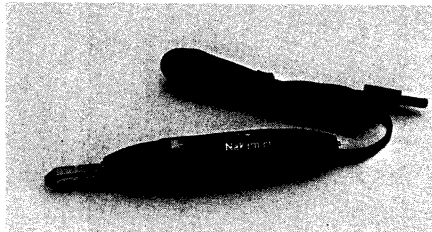
- Specifications and appearance design are subject to change for further improvement without notice.
- Dolby NR under license from Dolby Laboratories.
- The word "DOLBY NR" and the Double-D-Symbol are trademarks of Dolby Laboratories.



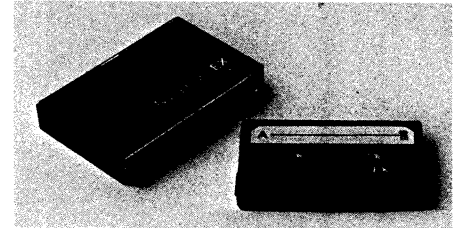
Optional Accessories



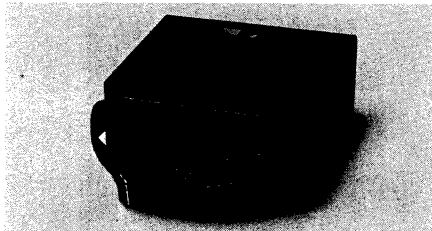
SX Cassette Tape C-60, C-90



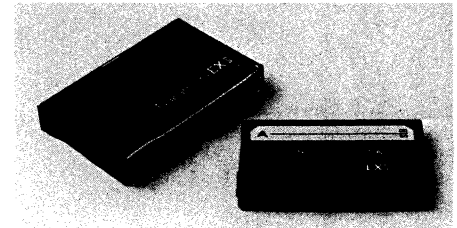
Head Demagnetizer



EX Cassette Tape C-60, C-90



Heavy-Duty Carrying Case



EXII Cassette Tape C-60, C-90